have been less than two per cent. The committee pertinently observe that their experiments derive much strength and coherence from their very multitude and variety; they have eliminated, as far as possible, the hypothesis of collusion, chance coincidence, and muscle or sign reading, and they are left with an accumulation of experiments which indicate clearly that thought transference is a possibility, or that there is some flaw in the evidence which they have been unable to discover. The third part of the Proceedings contains the first report of the committee on "mesmerism" and the first report of the Reichenbach committee, both of which will be found to contain a great deal more than is dreamt of in the philosophy of the ordinary world, though the committees respectively declare in the one case that they prefer to defer the publication of results, until a more complete reproduction of the experiments of others with added tests of their own have afforded a wider basis for discussion. The society has fairly established its demand for an inquiry by the scientific world, ever the most skeptical, and properly so, for it is the duty of science to reject everything that is not proven, while desirous, nay anxious, to take up any line of investigation that may lead to discoveries the ultimate result of which it cannot foresee.—*English Mechanic.*

ANTHROPOLOGY.[1]

THE PROTO-HELVETIANS.—The lowering of the levels of lakes Neuchatel and Bienne by the so-called "correction" of the Jura (a work undertaken for the prevention of floods) though it has by no means added to their beauty, is proving an immense gain to archæology. It has laid bare many Lacustrine stations, and rendered easy explorations which would otherwise have been impossible. Instead of the slow and often profitless process of dredging and picking up stray objects from between the piles at low water, the shrinkage of the lakes has permitted systematic excavations to be made in their former beds, on grounds which the Swiss antiquaries call the *couche archéologique*. The results are surprising beyond measure; besides throwing a flood of light on the history, the habits, and the civilization of the race of men who, thousands of years before the Christian era, made their homes on the lakes of Central Europe, and to whom has been given the apt name of Proto-Helvetians, they serve to correct old theories and suggest new conclusions. An idea of the richness of the finds made during the last ten years may be formed from the fact that the number of relics brought to light on lakes Bienne and Neuchatel since 1873, amounts to 19,599, of which 13,678 have been acquired by various Swiss museums. Nearly 6000 have been added to the collection of Dr. Goss, at Neuveville, on Lake Neuchatel, who has undertaken many explo-

[1] Edited by Prof. OTIS T. MASON, National Museum, Washington, D. C.

rations at his own cost, and in whose presence some of the most valuable discoveries have been made. He now owns the richest private collection of Lacustrine relics in existence, and at the request of many brother antiquaries, he has published thirty-three phototype plates, reproduced from photographs taken by himself, of his more important finds. The number of the objects depicted is nearly 1000, and being fac-similies of the originals, and half, and in some instances three-fifths, of the natural size, the illustrations, elucidated by the doctor's suggestive comments, are almost as interesting and instructive as a visit to the collection at Neuveville, according to Professor Morel, of Morges, a high authority, the most valuable, if not the largest, known to archæology.

Notwithstanding the doubts that have been expressed to the contrary, Dr. Goss holds to the theory of three ages, an age of stone, an age of bronze, and an age of iron, a theory to which every new discovery lends additional confirmation. There are Swiss lake dwellings where not a vestige of metal has been met with. There are others in which a few tools or arms of pure copper, and, exceptionally, of bronze are found. It is therefore a safe inference, as it is antecedently probable, that the use of copper preceded the use of bronze. In other stations, again, bronze preponderates and stone disappears. Last of all comes iron, first as a precious metal, ornamenting and encrusting the bronze which in the end it was destined to replace. A noteworthy fact is the comparative rareness of ruined villages of the age of bronze. On Lake Bienne there have been found the vestiges of thirteen villages of the stone age, and two only of the age of bronze; but the latter are far the more extensive.

The stone age is marked by three distinct periods. A first period, primitive and poor, characterized by the rudeness of its implements, the coarseness of its pottery, and an entire absence of stones of an exotic origin. Of this period the best type is the station of Charamus, near Neuveville, on lake Neuchatel. In the second period, the art of working in stone has reached almost perfection. Implements and weapons are well designed and deftly executed; exotic stones are abundant, the pottery is well made and richly ornamented. The types of this age are the stations of Locras and Latrigin, on Lake Bienne. The third period is characterized by the appearance of metals. It is a period of transition. There is still the same plenty of stone tools and arms, the general character of Lacustrine civilization remains unaltered, yet implements of copper, though few and far between, and rudely made, foreshadow an approaching change. This period is represented by the village of Fenil, on Lake Bienne, and the station of Roseaux, on Morgès near Leman. Next comes *le bel âge du bronze*, with its great development of art, to be followed, after the lapse of untold ages, by the age of iron, and

that mysterious conflagration in which perished a civilization as old as that of Egypt, and as interesting as that of Hellas.

There is a marked difference between the habitations as between the implements, of the age of stone and the age of metals. The former, if more numerous, are less extensive; they were but from fifty to one hundred yards from the shore; the piles which formed their foundations are short, and made generally of entire trunks of trees. Between the piles are found fragments of stag's horns, broken stones, pieces of rude pottery, and bones of animals. The stations of the age of bronze, on the contrary, were large villages, built at a distance of from 200 to 300 yards from the shore, on large, long, and often squared piles, between which are found remnants of fine pottery, and often entire vases. It is lower down, under the mud which has accumulated about the piles, that the great finds have been made. One of the most remarkable stations is the recently discovered village of Fenil. Although the exploration is not yet completed, more than thirty articles in pure copper have already been found, and as similar relics have lately come to light at Greng, on lake Thorat, at Peschiera, on Lake Garda, and in other places, antiquaries may ere long deem it expedient to add to the three recognized ages an age of copper.

The minute and systematic researches which have been made on the shores of Swiss lakes, albeit they have brought to light such a multitude of priceless relics, have not yet resulted in the discovery of a single Lacustrine habitation. A few charred planks and beams showing that they were destroyed by fire, are all that remain. Fortunately, however, we are not without light on the subject. A short time ago there was discovered in a marsh at Schussenried, in Wurtemburg, a well-preserved hut of the age of stone. The flooring and a part of the walls were intact, and, as appeared from a careful measurement, had formed, when complete, a rectangle, ten meters long and seven meters wide. The hut was divided into two compartments, communicating with each other by a foot-bridge, made of three girders. A single door looking toward the south, was a meter wide, and opened into a room 6.50 meters long and four meters wide. In one corner lay a heap of stones which had apparently formed the fireplace. This room was the kitchen, "the living room," and probably a night refuge for the cattle in cold weather. The second room, which had no opening outside, measured 6.50 meters long and five meters wide, and was no doubt used as the family bedchamber. The floors of both rooms were formed of sound logs, and the walls of split logs. This, be it remembered, was a hut of the stone age. It may be safely presumed that the dwellings of the bronze age were larger in size, and less primitive in their arrangements. At both periods the platform supporting the house communicated with the shore by means of a bridge (prob-

ably removable at pleasure) and with the water by ladders. These ladders, as appears from an example found at Chavannes, were made of a single stang with holes for the rungs, which protruded on either side.

The lake-dwellers, besides being carvers of stone, were workers in wood and skillful boat-builders. At Fenil and Chavannes have been found an ox yoke, fragments of tables, benches and doors, toy boats, hammers and spades, most of which Dr. Goss has presented to the museum of Berne. One of the best preserved canoes yet discovered was found in the stone age station of Vingrare (Lake Bienne) nearly three feet under the mud. The material is oak, the form of the stern square, like that of boats of the present day, the bow is pointed and spear-shaped. Its length is thirty-one feet two and a half inches, and in width it varies from twenty-nine and a half inches to thirty-five and a half inches. In order to prevent warping, the canoe was repeatedly washed with hot linseed oil, and afterwards rubbed with sand and wax, to fill up the interstices, by which means it has been kept in its original shape. With smaller objects of wood the same end is served by keeping them several weeks in alcohol or glycerine. Yew, however, is an exception; its durability exceeds that of oak; articles made from it show no signs of decay, and dry without warping.—[*To be continued.*]

THE ANTIQUITY OF MAN.—Professor Frederick W. Putnam, Curator of the Peabody Museum of American Archæology at Cambridge, made a few remarks at the semi-annual meeting of the American Antiquaries Society, bearing on the antiquity of man in America, based upon objects recently received at the museum.

He presented photographs of four blocks of tufa, each containing the imprint of a human foot. These blocks were cut from a bed of tufa sixteen feet from the surface, near the shore of Lake Managua, in Nicaragua, and were obtained by Dr. Earl Flint, who has been for several years investigating the archæology of Nicaragua for the museum, and has forwarded many important collections from the old burial mounds and shell heaps of that country. The volcanic materials above the foot-prints probably represent several distinct volcanic eruptions followed by deposits of silt. In one bed, apparently of clay and volcanic-ash, six and one-half feet above the foot-prints, many fossil leaves were found. Specimens of these are now in the museum, and their specific determination is awaited for with interest. While there can be no doubt of a great antiquity for these foot-prints, only a careful geological examination of the locality and a study of the fossils in the superimposed beds will determine whether that antiquity is to be counted by centuries or by geological time.

He also exhibited a portion of the right side of a human under-

jaw, which was found by Dr. C. C. Abbott in place in the gravel, fourteen feet from the surface, at the railroad cut near the station at Trenton, New Jersey. It will be remembered that in this same gravel deposit Dr. Abbott has found numerous rudely made implements of stone, and that in 1882 he found a human tooth, about twelve feet from the surface, not far from the spot where, as he states, the fragment of jaw was discovered on April 18, 1884. Both the tooth and piece of jaw are in the Peabody Museum, and they are much worn as if by attrition in the gravel, That they are as old as the gravel deposit itself there seems to be no doubt, whatever age geologists may assign to it, and they were apparently deposited under the same conditions as the mastodon tusk which was found several years since not far from where the human remains were discovered. While there is no doubt as to the human origin of the chipped stone implements which have been found in the Trenton gravel, a discovery to which archæology is indebted to Dr. Abbott, the fortunate finding of these fragments of the human skeleton add to the evidence which Dr. Abbott has obtained in relation to the existence of man previous to the formation of the great Trenton gravel deposit.

The discoveries announced in Professor Putnam's note are of the utmost importance, and they could not have fallen into more cautious hands. There is no doubt that Dr. Flint is an enthusiast on the antiquity of man in Central America. In a recent volume of the Smithsonian Annual Report, he is said to have found a cave that had been filled, after its formation, by tertiary sandstone. Now, on the removal of a portion of this sandstone, carvings, rock inscriptions were found on the walls of the cave, showing that man had arrived at the stage of rock carving in Central America before the deposits of tertiary sandstone. It is a pity that this cave cannot be visited by Professor Putnam.

Dr. Abbott's discovery, on the other hand, is simply in a line with his other finds. If man's works exist in the Trenton gravels, there is no improbability that man's remains will be found there. Wisely has Dr. Abbott yielded his own geological notions concerning his finds to the judgment of those who have studied systematically the Delaware basin.

ITINERANT ANTHROPOLOGY.—A new event in the history of anthropology in our country is the decision of Professor Baird to participate in the great State fairs. and notably in the cotton exposition at New Orleans. A system of glass knock-down cases has been devised, so that the objects may be mounted in the museum and shipped safely. On arriving at their destination the cases can be set up by two or three workmen in a day or two. The recent appropriation of Congress for the New Orleans exhibit was so amended as to include Cincinnati and Louisville. The brief space allowed for preparation necessarily made the

number of cases at the two latter cities rather small, but the choice made was a good one. Three areas of aboriginal life were admirably portrayed, Alaska, Queen Charlotte islands, and New Mexico. In cases running parallel, Eskimo and Haida life were set one against the other, to bring before the eye the fact that in close proximities the tribes of men are powerfully influenced by their environment. The preparation for New Orleans will be on a much larger scale. Professor Otis T. Mason, who has recently been appointed curator of ethnology in the National Museum, will have charge of these migratory anthropological exhibitions and wishes to make them as educational as possible.

SECTION OF ANTHROPOLOGY AT TURIN.—At the Esposizione Generale Italiana in Torino, 1884, the section of anthropology was organized with much care and included a wide treatment of the subject. The following scheme will give some idea of the method of installation:

CLASS I.

Methods and Processes employed in the Anthropologic Sciences.

Category 1. Instruments and apparatus of anthropometry.
" 2. Instruments and apparatus of craniometry and pelvimetry.
" 3. Measures of muscular force, dynamometry.
" 4. Measures of vital capacity, spirometry, spirography, thoracometry.
" 5. Measures of sensibility, æsthesiometry.
" 6. Measures of experimental psychology, reaction, reflex action, &c.
" 7. Measures of temperature, pulse and respiration, thermometry, sphygmography, pneumography.
" 8. Methods of weighing the brain.
" 9. Processes of mounting and preserving crania and skeletons.
" 10. Methods of preserving brains and other soft parts.
" 11. Cranio-cerebral topography.
" 12. Chromatic tables for the hair, skin and iris.
" 13. Methods of obtaining indices and means.
" 14. Anthropologic instruction in Italy.
" 15. Catalogues, plans and documents of Italian museums, public and private.
" 16. Special exhibition of Societa d'Anthropologia, Etnologia e Psicologia comparata.

CLASS II.

Comparative and General Anthropology.

Category 1. Physical characters of the anthropomorphous apes.
" 2. Human and comparative embryogeny.
" 3. Physical characters of the races of man.
" 4. Rudimentary and atavic characteristics.

CLASS III.

Anatomical Anthropology.

Category 1. Collections of typical Italian skulls.
" 2. Collections of typical Italian skeletons.

Category 3. Collections of male and female Italian pelves.
" 4. Collections of typical Italian brains.
" 5. Preparations showing the development of the skeleton.
" 6. Anthropological models and casts.

CLASS IV.

Anthropo-biology and Ethnology.

Category 1. Normal development in height, weight, strength, vitality.
" 2. Puberty and menstruation among Italian women.
" 3. Refraction in the eye in relation with skull-form, schools, sex, &c.
" 4. Physiologic and anthropometric studies upon Italians.
" 5. Distribution of color in the hair and eyes of Italians.
" 6. Expression and physiognomy of the Italians.
" 7. Acclimation of Italians in foreign countries.
" 8. Acclimation of non-Italian peoples in Italy.
" 9. Anthropology of Sardinia.

CLASS V.

Pathological Anthropology.

Category 1. Anomalies in the development of the human body.
" 2. Cranial pathology.
" 3. The delinquent classes in Italy.
" 4. The insane in Italy.
" 5. The defective classes.

CLASS VI.

Prehistoric and Palæoethnic Anthropology.

Category 1. Geologic time. The Tertiary.
" 2. " " The Quaternary.
" 3. " " Recent period, palæolithic, neolithic and bronze.

CLASS VII.

Ethnography.

Category 1. Clothing characteristic of different parts of Italy.
" 2. Ornaments.
" 3. Accessories of dress.
" 4. Tattooing.
" 5. Habitations in model and design.
" 6. Characteristic furniture.
" 7. Pottery.
" 8. Textiles.
" 9. Primary industries (taking the gifts of nature).
" 10. Receptacles of every kind.
" 11. Land transportation.
" 12. Water transportation.
" 13. Religion, superstitions, legends *et similia*.
" 14. Feasts, fêtes, carnivals.
" 15. Music.
" 16. Popular dances.
" 17. Songs, books and prints relating to literature and popular superstition.
" 18. Italian ethnography.

Class VII, in our scheme, would be termed Technography.